Rationale for Idaho Rulemaking Docket 58-0102-0601
Application of Standards Based on Flow

Background
As flows diminish, water quality begins to deteriorate (Boulton, 2003; Lake, 2003; Malan and Day, 2003; Caruso, 2002; Labe and Fausch, 2000; Lake, 2000; Closs and Lake, 1994; Stanley *et al.*, 1994; Jowett and Duncan, 1990). For example, as a stream loses flow, a greater proportion of the water is exposed to radiant energy resulting in increasing water temperatures. Other changes in water quality may include declines in dissolved oxygen concentrations, alterations in the rate of nutrient cycling, and increases in sedimentation and nutrients.

Federal regulations (40 CFR 131.13) implementing the Clean Water Act (CWA) allow states to include policies (such as low flow) in their water quality standards (WQS) that affect how standards are applied. In 2001, Idaho adopted into its water quality standards a provision addressing how water quality standards applied during sub-optimum flow periods for intermittent waters. More specifically, the rules state:

> *"Numeric water quality standards only apply to intermittent waters during optimum flow periods sufficient to support the uses for which the water body is designated. For recreation, optimum flow is equal to or greater than five (5) cubic feet per second (cfs). For aquatic life uses, optimum flow is equal to or greater than one (1) cfs."* (IDAPA 58.01.02.070.06)

This rule has a variety of limitations, which were, in part, reason for addressing this portion of Idaho WQS during the 2005 – 2008 triennial review. These limitations include:

1. Does not specifically address ephemeral waters, although DEQ has treated ephemeral waters as a more extreme case of intermittent waters;
2. Does not address very low flow in perennial waters;
3. Difficult to implement because it is currently difficult to determine which water bodies are considered intermittent and when their flow is suboptimal; and
4. Optimum flow thresholds do not adequately account for the inherent variability in water bodies throughout Idaho, e.g. 1cfs is a lot of water in a first order tributary, and almost nothing in a large river.

In addition, the water quality standards (IDAPA 58.01.02) have provisions related to flow that are in other disparate sections of the rule, e.g. Applicabilty of Gas Supersaturation Standard in section 300.

Rationale for changes
As part of this rulemaking, DEQ is proposing four primary changes to the water quality standards:
1. Revise the language addressing how standards apply during low flow conditions;
2. Consolidate disparate sections of the WQS that deal with how standards apply during flow extremes (both high and low);
3. Add flexibility to the turbidity standard such that DEQ may determine its applicability; and
4. Add a new beneficial use and associated criteria more suited to small headwater streams (likely ephemeral or intermittent but not necessarily so) that are naturally incapable of supporting viable fish populations, but whose water quality, when present, needs to be protected to support beneficial uses and meet criteria in downstream waters.

DEQ considered a variety of options when developing the proposed rule language. These options, along with DEQ's rationale for choosing the proposed language are discussed below.

Application of standards during low flow conditions
The proposed rule language allows low flow exemptions to be applied to perennial, intermittent, and ephemeral waters. A review of various state water quality standards indicate that other states apply low flow exemptions to all water bodies, rather than just intermittent streams. During periods of extreme low flow conditions, water quality deteriorates regardless of the duration of flow.

The proposed rule language specifies that narrative criteria apply to all water bodies when water is present, regardless of flow. This recognizes the importance of upstream flow to downstream uses. The language goes on to provide low flow exceptions for specified numeric criteria for parameters the literature indicates deteriorate with waning flow – this includes temperature, dissolved oxygen, and pH. DEQ considered including toxic constituents in the suite of numeric criteria that don't apply during periods of extreme low flow conditions; however, DEQ determined these were adequately addressed in Subsection 210.03.b of the WQS and naturally diminishing stream flows are not likely to result in greater concentrations of such constituents.

Current thresholds for optimum flows (1 cubic feet per second (cfs) for aquatic life uses and 5 cfs for recreation) appear to be arbitrary and do not adequately represent the wide variability in stream hydrogeomorphic characteristics throughout Idaho. For example, a discharge of 1 cfs for the Owyhee River is very different from 1 cfs in a small second order tributary to the Owyhee River. These thresholds were based on information contained within the *Protocols for conducting use attainability assessments for determining beneficial uses to be designated on Idaho stream segments* (Maret & Jensen, 1991). For the aquatic life use threshold (1 cfs), this document relies on information provided in the *Rapid Bioassessment Protocols for Use in Streams and Rivers: Benthic Macroinvertebrates and Fish* (Plafkin *et al.,* 1989). The second edition (Barbour *et al.,* 1999) of the RBP document departed from assessing habitat based on measures of flow and adopted a more holistic approach that evaluated the habitat diversity (categories of depth/velocity relationships) and availability (degree to which the channel is filled with water). Furthermore, based on a review of available biological data gathered as part of the DEQ beneficial use reconnaissance program, fish were often present in streams with flows less than 1 cfs.

For the reasons discussed above, DEQ embarked on an effort to find another suitable measure for optimum flow thresholds that could be used on a statewide basis. We directed our search on measures that would vary with stream or watershed size (flow/channel width, flow/watershed area) or might be good indicators regardless of stream size (depth, gradient, velocity). Stream depths and velocities are important to consider when assessing whether a stream is capable of supporting fish. If either stream depth or velocity is unsuitable, fish will not be present. Preferred velocities and depths can vary by species and life stage of fish. DEQ made an effort to find a threshold for velocity and depth measurements that represented the potential for fish presence; however, no such thresholds were readily available that could be applied statewide. Similar, stream depths are likely a better measure for the potential of recreational use of a water body; however, no depth thresholds were readily available in literature that could be applied statewide.

As a result, DEQ decided that most appropriate approach to address application of standards to low flow conditions would be to offer a few acceptable methods for determining what constitutes extreme low flows as well as allow the opportunity for site-specific determinations using other scientifically defensible methods. DEQ believes the flexibility of this approach will be most generally useful, but will likely require further guidance outside of rule to be applied.

Consolidation of disparate sections of the WQS

Currently, Idaho WQS address how water quality standards are applied to low flow (intermittent waters) and high flows (gas supersaturation exemption) in disparate sections. In order to make the WQS more 'user-friendly' DEQ is proposing to combine these provisions into a single section within the WQS.

Addition of flexibility for DEQ to determine the applicability of the turbidity standard
Although many water quality parameters naturally 'fall apart' at low flow, some are more affected by peak flows. DEQ recognizes that there will be instances where natural events (such as storm water run-off or during peak spring run-off) contribute to a violation of Idaho's numeric turbidity standard. Although this could be handled through natural background, often that is difficult to determine, even more so with fleeting events. Therefore, DEQ believes it is prudent to offer flexibility for the turbidity standard, similar to the total dissolved gas exemption, that recognizes and allows natural exceedances of numeric criteria.

Addition of a new beneficial use and associated criteria
The proposed non-fish bearing beneficial use is intended to typically apply to first or second order streams that often go dry during the summer months, that is primarily ephemeral and some intermittent waters. Current beneficial uses focus upon fish assemblages, and their associated criteria are likely over-protective of those systems that do not support fish per se, but do support aquatic life such as insects or mollusks when water is present. Idaho has many of these waters that are currently presumed to support cold water aquatic life. DEQ believes it is not appropriate to expect these smaller systems to exhibit the same water quality characteristics as larger, more robust water bodies.

While these streams are not expected to meet certain criteria (such as temperature or dissolved oxygen), these systems are expected to meet the general narrative criteria, general aquatic life criteria (pH and dissolved gas), and the toxics criteria. DEQ opted to omit specific temperature and dissolved oxygen criteria because much of the research for such criteria has focused on fish species, rather than macroinvertebrates or other aquatic invertebrates.

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